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REMARKS

In the Office Action, dated March 26, 2004, the Examiner states that Claims 1 and 2 are pending and Claims 1 and 2 are rejected. By the present Amendment, Applicant amends the claims.

In the Office Action, Claims 1 and 2 are rejected under 35 U.S.C. §103(a) as being unpatentable over US 5,830,370 in view of US 5,635,320. The Applicant considers these rejections overcome by the amendment to the claims.

The amendments find support in the description and drawings of the present amendment, specifically at page 5, lines 18 and 19; Figs. 2A and 2B; page 6, lines 10-14; and page 7, lines 12 and 13.

As now claimed in the present invention, each of the openings at a front and a rear side hole portion have a circular shape. In contrast, the larger opening (which corresponds to the front side opening in the present invention) in US '373 is not a circular shape, but a bulged portion 42a is formed outward in a radial direction from the center of the shadow mask (col. 6, lines 61-65, Figs. 3B and 4B). It is described also in US '373 that the shape of the bulged portion is not limited to 42a shown in Figs. 3B and 4B, but an arcuated pattern and a divided arcuated pattern 52 shown in Figs. 6A and 6B, a linear pattern and a divided linear pattern 54 shown in Figs. 6C and 6D (col. 9 lines 9-51) may be formed.

Furthermore, the smaller opening (which corresponds to the rear side opening in the present invention) in US '320 is not circularly shaped either, but similar structures to those in the larger opening in US '373 is described. An outward portion 40a is located outward in a radial direction with respect to the center of the shadow mask (col. 8, lines 9-14, Figs. 3, 4, 8 and 9). Similar to US '373, it is described also in US '320 that the shape of the outward portion is not limited to 40a shown in Figs. 3, 4, etc., but also an arcuated pattern and a divided arcuated pattern 52 shown in Figs. 11A and 11B, a linear pattern and a divided linear pattern 54 shown in Figs. 11C and 11D may be formed (col. 11 line 52-col. 12, line 58).

In both US '373 and US '320, there is nothing described regarding the circular shape with respect to the openings at a front and rear side hole portion of the throughhole of the shadow mask, as is claimed in the present invention.

It should be noted that the shapes of the openings at a front side and a rear side of the throughholes (apertures) open to the surface of each shadow mask disclosed in the present invention and in US '373 & '320, are essential features for each invention in order to achieve the respective object of the invention in passing and radiation of an electron beam, mechanical strength and quality, as well as for an easiness and economy in the manufacturing process thereof.

More specifically, it is described in US '373 that "the shadow mask 26 having those electron beam apertures 12 which are formed as described above can prevent omissions of electron beams passing through the electron beam apertures. Further, only that portion of the wall surface which is adjacent to the open edge of the large opening is made larger in diameter. As compared with a case where the entire wall surface which defines the large opening is made larger in diameter, the volume of the shadow mask 26 can remain high and its mechanical strength can be increased accordingly." (col. 12, lines 40-50) And also, it is described in US '320 that "the present invention has been made in view of the above problems, and its object is to provide a color cathode ray tube in which a desired electron beam passes through an electron beam aperture without causing electron beam spot distortion, and in which even when an electron beam collides against an aperture side wall, a reflected electron beam will not cause an unnecessary phosphor to emit light, and a method of manufacturing the same." (col. 3, lines 21-28)

It is natural that a person skilled in the art could not change the shape of the openings at a front side and a rear side of the throughholes (apertures) in the shadow mask disclosed in the present invention and in US '373 & '320 with each other, since these are an essential feature in the respective invention in

order to achieve the particular purpose thereof. If changed, the particular purpose of each invention could not be achieved as a matter of course.

Further, as claimed in the present invention, the taper size T is defined as an average value of the individual portions of the taper surfaces, which is represented by the formula $T = (S - Q)/2$, wherein S denotes the hole width at the end of said front side hole portion and Q denotes the hole width at said ridge portion, and said taper size T is within a range of from 30 to 40% of the thickness of the shadow mask.

Although the rejection asserts the value disclosed in US '373 (col. 7 lines 44-51) satisfies the taper size $T = (S - Q)/2$ within a range of 30-40% of the thickness of the shadow mask as claimed, presuming that the large opening diameter D disclosed in US '373 corresponds to the hole width S in the present invention and the small opening diameter d in US '373 corresponds to the hole width Q in the invention, the Applicant considers that assertion to be inaccurate. As mentioned above, since each shape of the front side hole portion in the invention and in US '373 is different from each other, comparison itself of these values of large and small diameters in an opening, and thickness of a shadow mask is meaningless.


As claimed, the shadow mask in the present invention in which the shape of each opening is circular (having no bulged portion) and a front side hole portion is shifted toward the outer peripheral side of the shadow mask relative to the rear side hole portion, the taper size T as an average value of the individual portions of the taper surface of the throughholes and represented by the formula $T = (S - Q)/2$, is within a range of 30-40% of the thickness of the shadow mask. In other words, by setting the taper size T as defined in the shadow mask having specific structure as claimed within the prescribed range as claimed, such intended objectives can be achieved that an etching amount at the front side hole portion formed with a larger area as compared with the rear side hole portion is reduced, thereby mechanical strength of a shadow mask against vibration and impact is improved while obtaining a desired and satisfactory

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electron beam spot on a fluorescent surface without causing a halation and the like.

In light of the foregoing response, all the outstanding objections and rejections have been overcome. Applicant respectfully submits that this application should now be in better condition for allowance and respectfully requests favorable consideration.

Respectfully submitted,



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Date

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